



Attorney Docket No. 01107.00098

**PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of )  
 )  
Nicholas NICOLAIDES et al. )  
 )  
Serial No. 09/780,675 )  
 )  
Filed: February 12, 2001 )

For: METHODS FOR GENERATING HYPERMUTABLE MICROBES

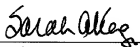
**SUBMISSION OF SEQUENCE LISTING**

Assistant Commissioner of Patents & Trademarks  
Washington, D.C. 20231

Dear Sir:

A paper copy and a CRF of a sequence listing are submitted herewith to place the application in compliance with U.S. regulations. I believe that the sequences in the two forms of the sequence listing are identical and add no new matter to the application.

Respectfully submitted,



Sarah A. Kagan  
Reg. No. 32,141

Date: June 11, 2001

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Washington, D.C. 20001-4597  
Telephone: 202/508-9100



AS

SEQUENCE LISTING

<110> Nicolaidēs, Nicholas  
Sass, Philip  
Grasso, Luigi  
Vogelstein, Bert  
Kinzler, Kenneth

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 Arg Ala Leu Arg Ser His Asn Asp Glu Tyr Ser Lys Ile Leu Asp Val  
 165 170 175  
 Val Gly Arg Tyr Ala Ile His Ser Lys Asp Ile Gly Phe Ser Cys Lys  
 180 185 190  
 Lys Phe Gly Asp Ser Asn Tyr Ser Leu Ser Val Lys Pro Ser Tyr Thr  
 195 200 205  
 Val Gln Asp Arg Ile Arg Thr Val Phe Asn Lys Ser Val Ala Ser Asn  
 210 215 220  
 Leu Ile Thr Phe His Ile Ser Lys Val Glu Asp Leu Asn Leu Glu Ser  
 225 230 235 240  
 Val Asp Gly Lys Val Cys Asn Leu Asn Phe Ile Ser Lys Lys Ser Ile  
 245 250 255  
 Ser Leu Ile Phe Phe Ile Asn Asn Arg Leu Val Thr Cys Asp Leu Leu  
 260 265 270  
 Arg Arg Ala Leu Asn Ser Val Tyr Ser Asn Tyr Leu Pro Lys Gly Phe  
 275 280 285  
 Arg Pro Phe Ile Tyr Leu Gly Ile Val Ile Asp Pro Ala Ala Val Asp  
 290 295 300  
 Val Asn Val His Pro Thr Lys Arg Glu Val Arg Phe Leu Ser Gln Asp  
 305 310 315 320  
 Glu Ile Ile Glu Lys Ile Ala Asn Gln Leu His Ala Glu Leu Ser Ala  
 325 330 335  
 Ile Asp Thr Ser Arg Thr Phe Lys Ala Ser Ser Ile Ser Thr Asn Lys  
 340 345 350  
 Pro Glu Ser Leu Ile Pro Phe Asn Asp Thr Ile Glu Ser Asp Arg Asn  
 355 360 365  
 Arg Lys Ser Leu Arg Gln Ala Gln Val Val Glu Asn Ser Tyr Thr Thr  
 370 375 380  
 Ala Asn Ser Gln Leu Arg Lys Ala Lys Arg Gln Glu Asn Lys Leu Val  
 385 390 395 400  
 Arg Ile Asp Ala Ser Gln Ala Lys Ile Thr Ser Phe Leu Ser Ser Ser  
 405 410 415  
 Gln Gln Phe Asn Phe Glu Gly Ser Ser Thr Lys Arg Gln Leu Ser Glu  
 420 425 430  
 Pro Lys Val Thr Asn Val Ser His Ser Gln Glu Ala Glu Lys Leu Thr  
 435 440 445  
 Leu Asn Glu Ser Glu Gln Pro Arg Asp Ala Asn Thr Ile Asn Asp Asn  
 450 455 460  
 Asp Leu Lys Asp Gln Pro Lys Lys Lys Gln Lys Leu Gly Asp Tyr Lys  
 465 470 475 480  
 Val Pro Ser Ile Ala Asp Asp Glu Lys Asn Ala Leu Pro Ile Ser Lys  
 485 490 495  
 Asp Gly Tyr Ile Arg Val Pro Lys Glu Arg Val Asn Val Asn Leu Thr  
 500 505 510  
 Ser Ile Lys Lys Leu Arg Glu Lys Val Asp Asp Ser Ile His Arg Glu  
 515 520 525  
 Leu Thr Asp Ile Phe Ala Asn Leu Asn Tyr Val Gly Val Val Asp Glu  
 530 535 540  
 Glu Arg Arg Leu Ala Ala Ile Gln His Asp Leu Lys Leu Phe Leu Ile

545                      550                      555                      560  
 Asp Tyr Gly Ser Val Cys Tyr Glu Leu Phe Tyr Gln Ile Gly Leu Thr  
                                  565                      570                      575  
 Asp Phe Ala Asn Phe Gly Lys Ile Asn Leu Gln Ser Thr Asn Val Ser  
                                  580                      585                      590  
 Asp Asp Ile Val Leu Tyr Asn Leu Leu Ser Glu Phe Asp Glu Leu Asn  
                                  595                      600                      605  
 Asp Asp Ala Ser Lys Glu Lys Ile Ile Ser Lys Ile Trp Asp Met Ser  
                                  610                      615                      620  
 Ser Met Leu Asn Glu Tyr Tyr Ser Ile Glu Leu Val Asn Asp Gly Leu  
                                  625                      630                      635  
 Asp Asn Asp Leu Lys Ser Val Lys Leu Lys Ser Leu Pro Leu Leu Leu  
                                  645                      650                      655  
 Lys Gly Tyr Ile Pro Ser Leu Val Lys Leu Pro Phe Phe Ile Tyr Arg  
                                  660                      665                      670  
 Leu Gly Lys Glu Val Asp Trp Glu Asp Glu Gln Glu Cys Leu Asp Gly  
                                  675                      680                      685  
 Ile Leu Arg Glu Ile Ala Leu Leu Tyr Ile Pro Asp Met Val Pro Lys  
                                  690                      695                      700  
 Val Asp Thr Leu Asp Ala Ser Leu Ser Glu Asp Glu Lys Ala Gln Phe  
                                  705                      710                      715  
 Ile Asn Arg Lys Glu His Ile Ser Ser Leu Leu Glu His Val Leu Phe  
                                  725                      730                      735  
 Pro Cys Ile Lys Arg Arg Phe Leu Ala Pro Arg His Ile Leu Lys Asp  
                                  740                      745                      750  
 Val Val Glu Ile Ala Asn Leu Pro Asp Leu Tyr Lys Val Phe Glu Arg  
                                  755                      760                      765  
 Cys

<210> 16

<211> 859

<212> PRT

<213> Mus musculus

<400> 16

Met Glu Gln Thr Glu Gly Val Ser Thr Glu Cys Ala Lys Ala Ile Lys  
 1                      5                      10                      15  
 Pro Ile Asp Gly Lys Ser Val His Gln Ile Cys Ser Gly Gln Val Ile  
                                  20                      25                      30  
 Leu Ser Leu Ser Thr Ala Val Lys Glu Leu Ile Glu Asn Ser Val Asp  
                                  35                      40                      45  
 Ala Gly Ala Thr Thr Ile Asp Leu Arg Leu Lys Asp Tyr Gly Val Asp  
                                  50                      55                      60  
 Leu Ile Glu Val Ser Asp Asn Gly Cys Gly Val Glu Glu Asn Phe  
                                  65                      70                      75  
 Glu Gly Leu Ala Leu Lys His His Thr Ser Lys Ile Gln Glu Phe Ala  
                                  85                      90                      95  
 Asp Leu Thr Gln Val Glu Thr Phe Gly Phe Arg Gly Glu Ala Leu Ser  
                                  100                      105                      110  
 Ser Leu Cys Ala Leu Ser Asp Val Thr Ile Ser Thr Cys His Gly Ser  
                                  115                      120                      125  
 Ala Ser Val Gly Thr Arg Leu Val Phe Asp His Asn Gly Lys Ile Thr  
                                  130                      135                      140  
 Gln Lys Thr Pro Tyr Pro Arg Pro Lys Gly Thr Thr Val Ser Val Gln  
                                  145                      150                      155  
 His Leu Phe Tyr Thr Leu Pro Val Arg Tyr Lys Glu Phe Gln Arg Asn  
                                  165                      170                      175  
 Ile Lys Lys Glu Tyr Ser Lys Met Val Gln Val Leu Gln Ala Tyr Cys

Ile	Ile	Ser	Ala	Gly	Val	Arg	Val	Ser	Cys	Thr	Asn	Gln	Leu	Gly	Gln	180	185	190
		195						200				205						
Gly	Lys	Arg	His	Ala	Val	Val	Cys	Thr	Ser	Gly	Thr	Ser	Gly	Met	Lys			
	210					215					220							
Glu	Asn	Ile	Gly	Ser	Val	Phe	Gly	Gln	Lys	Gln	Leu	Gln	Ser	Leu	Ile			
225					230					235					240			
Pro	Phe	Val	Gln	Leu	Pro	Pro	Ser	Asp	Ala	Val	Cys	Glu	Glu	Tyr	Gly			
			245						250						255			
Leu	Ser	Thr	Ser	Gly	Arg	His	Lys	Thr	Phe	Ser	Thr	Phe	Arg	Ala	Ser			
			260					265					270					
Phe	His	Ser	Ala	Arg	Thr	Ala	Pro	Gly	Gly	Val	Gln	Gln	Thr	Gly	Ser			
		275					280					285						
Phe	Ser	Ser	Ser	Ile	Arg	Gly	Pro	Val	Thr	Gln	Gln	Arg	Ser	Leu	Ser			
	290					295					300							
Leu	Ser	Met	Arg	Phe	Tyr	His	Met	Tyr	Asn	Arg	His	Gln	Tyr	Pro	Phe			
305					310					315					320			
Val	Val	Leu	Asn	Val	Ser	Val	Asp	Ser	Glu	Cys	Val	Asp	Ile	Asn	Val			
			325						330					335				
Thr	Pro	Asp	Lys	Arg	Gln	Ile	Leu	Leu	Gln	Glu	Glu	Lys	Leu	Leu	Leu			
			340					345						350				
Ala	Val	Leu	Lys	Thr	Ser	Leu	Ile	Gly	Met	Phe	Asp	Ser	Asp	Ala	Asn			
		355					360					365						
Lys	Leu	Asn	Val	Asn	Gln	Gln	Pro	Leu	Leu	Asp	Val	Glu	Gly	Asn	Leu			
	370					375					380							
Val	Lys	Leu	His	Thr	Ala	Glu	Leu	Glu	Lys	Pro	Val	Pro	Gly	Lys	Gln			
385					390					395					400			
Asp	Asn	Ser	Pro	Ser	Leu	Lys	Ser	Thr	Ala	Asp	Glu	Lys	Arg	Val	Ala			
			405						410					415				
Ser	Ile	Ser	Arg	Leu	Arg	Glu	Ala	Phe	Ser	Leu	His	Pro	Thr	Lys	Glu			
			420					425					430					
Ile	Lys	Ser	Arg	Gly	Pro	Glu	Thr	Ala	Glu	Leu	Thr	Arg	Ser	Phe	Pro			
		435				440						445						
Ser	Glu	Lys	Arg	Gly	Val	Leu	Ser	Ser	Tyr	Pro	Ser	Asp	Val	Ile	Ser			
	450					455					460							
Tyr	Arg	Gly	Leu	Arg	Gly	Ser	Gln	Asp	Lys	Leu	Val	Ser	Pro	Thr	Asp			
465				470					475						480			
Ser	Pro	Gly	Asp	Cys	Met	Asp	Arg	Glu	Lys	Ile	Glu	Lys	Asp	Ser	Gly			
			485						490				495					
Leu	Ser	Ser	Thr	Ser	Ala	Gly	Ser	Glu	Glu	Phe	Ser	Thr	Pro	Glu				
		500						505				510						
Val	Ala	Ser	Ser	Phe	Ser	Ser	Asp	Tyr	Asn	Val	Ser	Ser	Leu	Glu	Asp			
		515					520					525						
Arg	Pro	Ser	Gln	Glu	Thr	Ile	Asn	Cys	Gly	Asp	Leu	Asp	Cys	Arg	Pro			
	530					535					540							
Pro	Gly	Thr	Gly	Gln	Ser	Leu	Lys	Pro	Glu	Asp	His	Gly	Tyr	Gln	Cys			
545				550						555					560			
Lys	Ala	Leu	Pro	Leu	Ala	Arg	Leu	Ser	Pro	Thr	Asn	Ala	Lys	Arg	Phe			
			565						570				575					
Lys	Thr	Glu	Glu	Arg	Pro	Ser	Asn	Val	Asn	Ile	Ser	Gln	Arg	Leu	Pro			
		580						585					590					
Gly	Pro	Gln	Ser	Thr	Ser	Ala	Ala	Glu	Val	Asp	Val	Ala	Ile	Lys	Met			
		595					600					605						
Asn	Lys	Arg	Ile	Val	Leu	Leu	Glu	Phe	Ser	Leu	Ser	Ser	Leu	Ala	Lys			
	610					615					620							
Arg	Met	Lys	Gln	Leu	Gln	His	Leu	Lys	Ala	Gln	Asn	Lys	His	Glu	Leu			
625				630						635					640			
Ser	Tyr	Arg	Lys	Phe	Arg	Ala	Lys	Ile	Cys	Pro	Gly	Glu	Asn	Gln	Ala			
			645						650				655					

Ala Glu Asp Glu Leu Arg Lys Glu Ile Ser Lys Ser Met Phe Ala Glu  
660 665  
Met Glu Ile Leu Gly Gln Phe Asn Leu Gly Phe Ile Val Thr Lys Leu  
675 680 685  
Lys Glu Asp Leu Phe Leu Val Asp Gln His Ala Ala Asp Glu Lys Tyr  
690 695 700  
Asn Phe Glu Met Leu Gln His Thr Val Leu Gln Ala Gln Arg Leu  
705 710 715 720  
Ile Thr Pro Gln Thr Leu Asn Leu Thr Ala Val Asn Glu Ala Val Leu  
725 730 735  
Ile Glu Asn Leu Glu Ile Phe Arg Lys Asn Gly Phe Asp Phe Val Ile  
740 745 750  
Asp Glu Asp Ala Pro Val Thr Glu Arg Ala Lys Leu Ile Ser Leu Pro  
755 760 765  
Thr Ser Lys Asn Trp Thr Phe Gly Pro Gln Asp Ile Asp Glu Leu Ile  
770 775 780  
Phe Met Leu Ser Asp Ser Pro Gly Val Met Cys Arg Pro Ser Arg Val  
785 790 795 800  
Arg Gln Met Phe Ala Ser Arg Ala Cys Arg Lys Ser Val Met Ile Gly  
805 810 815  
Thr Ala Leu Asn Ala Ser Glu Met Lys Lys Leu Ile Thr His Met Gly  
820 825 830  
Glu Met Asp His Pro Trp Asn Cys Pro His Gly Arg Pro Thr Met Arg  
835 840 845  
His Val Ala Asn Leu Asp Val Ile Ser Gln Asn  
850 855

<210> 17  
<211> 932  
<212> PRT  
<213> Homo sapiens

<400> 17  
Met Lys Gln Leu Pro Ala Ala Thr Val Arg Leu Leu Ser Ser Ser Gln  
1 5 10 15  
Ile Ile Thr Ser Val Val Ser Val Val Lys Glu Leu Ile Glu Asn Ser  
20 25 30  
Leu Asp Ala Gly Ala Thr Ser Val Asp Val Lys Leu Glu Asn Tyr Gly  
35 40 45  
Phe Asp Lys Ile Glu Val Arg Asp Asn Gly Glu Gly Ile Lys Ala Val  
50 55 60  
Asp Ala Pro Val Met Ala Met Lys Tyr Tyr Thr Ser Lys Ile Asn Ser  
65 70 75 80  
His Glu Asp Leu Glu Asn Leu Thr Thr Tyr Gly Phe Arg Gly Glu Ala  
85 90 95  
Leu Gly Ser Ile Cys Cys Ile Ala Glu Val Leu Ile Thr Thr Arg Thr  
100 105 110  
Ala Ala Asp Asn Phe Ser Thr Gln Tyr Val Leu Asp Gly Ser Gly His  
115 120 125  
Ile Leu Ser Gln Lys Pro Ser His Leu Gly Gln Gly Thr Thr Val Thr  
130 135 140  
Ala Leu Arg Leu Phe Lys Asn Leu Pro Val Arg Lys Gln Phe Tyr Ser  
145 150 155 160  
Thr Ala Lys Lys Cys Lys Asp Glu Ile Lys Lys Ile Gln Asp Leu Leu  
165 170 175  
Met Ser Phe Gly Ile Leu Lys Pro Asp Leu Arg Ile Val Phe Val His  
180 185 190  
Asn Lys Ala Val Ile Trp Gln Lys Ser Arg Val Ser Asp His Lys Met  
195 200 205

Ala Leu Met Ser Val Leu Gly Thr Ala Val Met Asn Asn Met Glu Ser  
 210 215 220  
 Phe Gln Tyr His Ser Glu Glu Ser Gln Ile Tyr Leu Ser Gly Phe Leu  
 225 230 235 240  
 Pro Lys Cys Asp Ala Asp His Ser Phe Thr Ser Leu Ser Thr Pro Glu  
 245 250 255  
 Arg Ser Phe Ile Phe Ile Asn Ser Arg Pro Val His Gln Lys Asp Ile  
 260 265 270  
 Leu Lys Leu Ile Arg His His Tyr Asn Leu Lys Cys Leu Lys Glu Ser  
 275 280 285  
 Thr Arg Leu Tyr Pro Val Phe Phe Leu Lys Ile Asp Val Pro Thr Ala  
 290 295 300  
 Asp Val Asp Val Asn Leu Thr Pro Asp Lys Ser Gln Val Leu Leu Gln  
 305 310 315 320  
 Asn Lys Glu Ser Val Leu Ile Ala Leu Glu Asn Leu Met Thr Thr Cys  
 325 330 335  
 Tyr Gly Pro Leu Pro Ser Thr Asn Ser Tyr Glu Asn Asn Lys Thr Asp  
 340 345 350  
 Val Ser Ala Ala Asp Ile Val Leu Ser Lys Thr Ala Glu Thr Asp Val  
 355 360 365  
 Leu Phe Asn Lys Val Glu Ser Ser Gly Lys Asn Tyr Ser Asn Val Asp  
 370 375 380  
 Thr Ser Val Ile Pro Phe Gln Asn Asp Met His Asn Asp Glu Ser Gly  
 385 390 395 400  
 Lys Asn Thr Asp Asp Cys Leu Asn His Gln Ile Ser Ile Gly Asp Phe  
 405 410 415  
 Gly Tyr Gly His Cys Ser Ser Glu Ile Ser Asn Ile Asp Lys Asn Thr  
 420 425 430  
 Lys Asn Ala Phe Gln Asp Ile Ser Met Ser Asn Val Ser Trp Glu Asn  
 435 440 445  
 Ser Gln Thr Glu Tyr Ser Lys Thr Cys Phe Ile Ser Ser Val Lys His  
 450 455 460  
 Thr Gln Ser Glu Asn Gly Asn Lys Asp His Ile Asp Glu Ser Gly Glu  
 465 470 475 480  
 Asn Glu Glu Glu Ala Gly Leu Glu Asn Ser Ser Glu Ile Ser Ala Asp  
 485 490 495  
 Glu Trp Ser Arg Gly Asn Ile Leu Lys Asn Ser Val Gly Glu Asn Ile  
 500 505 510  
 Glu Pro Val Lys Ile Leu Val Pro Glu Lys Ser Leu Pro Cys Lys Val  
 515 520 525  
 Ser Asn Asn Asn Tyr Pro Ile Pro Glu Gln Met Asn Leu Asn Glu Asp  
 530 535 540  
 Ser Cys Asn Lys Lys Ser Asn Val Ile Asp Asn Lys Ser Gly Lys Val  
 545 550 555 560  
 Thr Ala Tyr Asp Leu Leu Ser Asn Arg Val Ile Lys Lys Pro Met Ser  
 565 570 575  
 Ala Ser Ala Leu Phe Val Gln Asp His Arg Pro Gln Phe Leu Ile Glu  
 580 585 590  
 Asn Pro Lys Thr Ser Leu Glu Asp Ala Thr Leu Gln Ile Glu Glu Leu  
 595 600 605  
 Trp Lys Thr Leu Ser Glu Glu Lys Leu Lys Tyr Glu Glu Lys Ala  
 610 615 620  
 Thr Lys Asp Leu Glu Arg Tyr Asn Ser Gln Met Lys Arg Ala Ile Glu  
 625 630 635 640  
 Gln Glu Ser Gln Met Ser Leu Lys Asp Gly Arg Lys Lys Ile Lys Pro  
 645 650 655  
 Thr Ser Ala Trp Asn Leu Ala Gln Lys His Lys Leu Lys Thr Ser Leu  
 660 665 670  
 Ser Asn Gln Pro Lys Leu Asp Glu Leu Leu Gln Ser Gln Ile Glu Lys

675                      680                      685  
 Arg Arg Ser Gln Asn Ile Lys Met Val Gln Ile Pro Phe Ser Met Lys  
 690                      695                      700  
 Asn Leu Lys Ile Asn Phe Lys Lys Gln Asn Lys Val Asp Leu Glu Glu  
 705                      710                      715                      720  
 Lys Asp Glu Pro Cys Leu Ile His Asn Leu Arg Phe Pro Asp Ala Trp  
 725                      730                      735  
 Leu Met Thr Ser Lys Thr Glu Val Met Leu Leu Asn Pro Tyr Arg Val  
 740                      745                      750  
 Glu Glu Ala Leu Leu Phe Lys Arg Leu Leu Glu Asn His Lys Leu Pro  
 755                      760                      765  
 Ala Glu Pro Leu Glu Lys Pro Ile Met Leu Thr Glu Ser Leu Phe Asn  
 770                      775                      780  
 Gly Ser His Tyr Leu Asp Val Leu Tyr Lys Met Thr Ala Asp Asp Gln  
 785                      790                      795                      800  
 Arg Tyr Ser Gly Ser Thr Tyr Leu Ser Asp Pro Arg Leu Thr Ala Asn  
 805                      810                      815  
 Gly Phe Lys Ile Lys Leu Ile Pro Gly Val Ser Ile Thr Glu Asn Tyr  
 820                      825                      830  
 Leu Glu Ile Glu Gly Met Ala Asn Cys Leu Pro Phe Tyr Gly Val Ala  
 835                      840                      845  
 Asp Leu Lys Glu Ile Leu Asn Ala Ile Leu Asn Arg Asn Ala Lys Glu  
 850                      855                      860  
 Val Tyr Glu Cys Arg Pro Arg Lys Val Ile Ser Tyr Leu Glu Gly Glu  
 865                      870                      875                      880  
 Ala Val Arg Leu Ser Arg Gln Leu Pro Met Tyr Leu Ser Lys Glu Asp  
 885                      890                      895  
 Ile Gln Asp Ile Ile Tyr Arg Met Lys His Gln Phe Gly Asn Glu Ile  
 900                      905                      910  
 Lys Glu Cys Val His Gly Arg Pro Phe Phe His His Leu Thr Tyr Leu  
 915                      920                      925  
 Pro Glu Thr Thr  
 930

<210> 18  
 <211> 932  
 <212> PRT  
 <213> Homo sapiens

<400> 18  
 Met Lys Gln Leu Pro Ala Ala Thr Val Arg Leu Leu Ser Ser Ser Gln  
 1                      5                      10                      15  
 Ile Ile Thr Ser Val Val Ser Val Val Lys Glu Leu Ile Glu Asn Ser  
 20                      25                      30  
 Leu Asp Ala Gly Ala Thr Ser Val Asp Val Lys Leu Glu Asn Tyr Gly  
 35                      40                      45  
 Phe Asp Lys Ile Glu Val Arg Asp Asn Gly Glu Gly Ile Lys Ala Val  
 50                      55                      60  
 Asp Ala Pro Val Met Ala Met Lys Tyr Tyr Thr Ser Lys Ile Asn Ser  
 65                      70                      75                      80  
 His Glu Asp Leu Glu Asn Leu Thr Thr Tyr Gly Phe Arg Gly Glu Ala  
 85                      90                      95  
 Leu Gly Ser Ile Cys Cys Ile Ala Glu Val Leu Ile Thr Thr Arg Thr  
 100                      105                      110  
 Ala Ala Asp Asn Phe Ser Thr Gln Tyr Val Leu Asp Gly Ser Gly His  
 115                      120                      125  
 Ile Leu Ser Gln Lys Pro Ser His Leu Gly Gln Gly Thr Thr Val Thr  
 130                      135                      140  
 Ala Leu Arg Leu Phe Lys Asn Leu Pro Val Arg Lys Gln Phe Tyr Ser



Thr	Ala	Lys	Lys	Cys	Lys	Asp	Glu	Ile	Lys	Lys	Ile	Gln	Asp	Leu	Leu
Met	Ser	Phe	Gly	Ile	Leu	Lys	Pro	Asp	Leu	Arg	Ile	Val	Phe	Val	His
Asn	Lys	Ala	Val	Ile	Trp	Gln	Lys	Ser	Arg	Val	Ser	Asp	His	Lys	Met
Ala	Leu	Met	Ser	Val	Leu	Gly	Thr	Ala	Val	Met	Asn	Asn	Met	Glu	Ser
Phe	Gln	Tyr	His	Ser	Glu	Glu	Ser	Gln	Ile	Tyr	Leu	Ser	Gly	Phe	Leu
Pro	Lys	Cys	Asp	Ala	Asp	His	Ser	Phe	Thr	Ser	Leu	Ser	Thr	Pro	Glu
Arg	Ser	Phe	Ile	Phe	Ile	Asn	Ser	Arg	Pro	Val	His	Gln	Lys	Asp	Ile
Leu	Lys	Leu	Ile	Arg	His	His	Tyr	Asn	Leu	Lys	Cys	Leu	Lys	Glu	Ser
Thr	Arg	Leu	Tyr	Pro	Val	Phe	Phe	Leu	Lys	Ile	Asp	Val	Pro	Thr	Ala
Asp	Val	Asp	Val	Asn	Leu	Thr	Pro	Asp	Lys	Ser	Gln	Val	Leu	Leu	Gln
Asn	Lys	Glu	Ser	Val	Leu	Ile	Ala	Leu	Glu	Asn	Leu	Met	Thr	Thr	Cys
Tyr	Gly	Pro	Leu	Pro	Ser	Thr	Asn	Ser	Tyr	Glu	Asn	Asn	Lys	Thr	Asp
Val	Ser	Ala	Ala	Asp	Ile	Val	Leu	Ser	Lys	Thr	Ala	Glu	Thr	Asp	Val
Leu	Phe	Asn	Lys	Val	Glu	Ser	Ser	Gly	Lys	Asn	Tyr	Ser	Asn	Val	Asp
Thr	Ser	Val	Ile	Pro	Phe	Gln	Asn	Asp	Met	His	Asn	Asp	Glu	Ser	Gly
Lys	Asn	Thr	Asp	Asp	Cys	Leu	Asn	His	Gln	Ile	Ser	Ile	Gly	Asp	Phe
Gly	Tyr	Gly	His	Cys	Ser	Ser	Glu	Ile	Ser	Asn	Ile	Asp	Lys	Asn	Thr
Lys	Asn	Ala	Phe	Gln	Asp	Ile	Ser	Met	Ser	Asn	Val	Ser	Trp	Glu	Asn
Ser	Gln	Thr	Glu	Tyr	Ser	Lys	Thr	Cys	Phe	Ile	Ser	Ser	Val	Lys	His
Thr	Gln	Ser	Glu	Asn	Gly	Asn	Lys	Asp	His	Ile	Asp	Glu	Ser	Gly	Glu
Asn	Glu	Glu	Glu	Ala	Gly	Leu	Glu	Asn	Ser	Ser	Glu	Ile	Ser	Ala	Asp
Glu	Trp	Ser	Arg	Gly	Asn	Ile	Leu	Lys	Asn	Ser	Val	Gly	Glu	Asn	Ile
Glu	Pro	Val	Lys	Ile	Leu	Val	Pro	Glu	Lys	Ser	Leu	Pro	Cys	Lys	Val
Ser	Asn	Asn	Asn	Tyr	Pro	Ile	Pro	Glu	Gln	Met	Asn	Leu	Asn	Glu	Asp
Ser	Cys	Asn	Lys	Lys	Ser	Asn	Val	Ile	Asp	Asn	Lys	Ser	Gly	Lys	Val
Thr	Ala	Tyr	Asp	Leu	Leu	Ser	Asn	Arg	Val	Ile	Lys	Lys	Pro	Met	Ser
Ala	Ser	Ala	Leu	Phe	Val	Gln	Asp	His	Arg	Pro	Gln	Phe	Leu	Ile	Glu
Asn	Pro	Lys	Thr	Ser	Leu	Glu	Asp	Ala	Thr	Leu	Gln	Ile	Glu	Glu	Leu
Trp	Lys	Thr	Leu	Ser	Glu	Glu	Glu	Lys	Leu	Lys	Tyr	Glu	Glu	Lys	Ala

Thr Lys Asp Leu Glu Arg Tyr Asn Ser Gln Met Lys Arg Ala Ile Glu  
 625 630 635 640  
 Gln Glu Ser Gln Met Ser Leu Lys Asp Gly Arg Lys Lys Ile Lys Pro  
 645 650 655  
 Thr Ser Ala Trp Asn Leu Ala Gln Lys His Lys Leu Lys Thr Ser Leu  
 660 665 670  
 Ser Asn Gln Pro Lys Leu Asp Glu Leu Leu Gln Ser Gln Ile Glu Lys  
 675 680 685  
 Arg Arg Ser Gln Asn Ile Lys Met Val Gln Ile Pro Phe Ser Met Lys  
 690 695 700  
 Asn Leu Lys Ile Asn Phe Lys Lys Gln Asn Lys Val Asp Leu Glu Glu  
 705 710 715 720  
 Lys Asp Glu Pro Cys Leu Ile His Asn Leu Arg Phe Pro Asp Ala Trp  
 725 730 735  
 Leu Met Thr Ser Lys Thr Glu Val Met Leu Leu Asn Pro Tyr Arg Val  
 740 745 750  
 Glu Glu Ala Leu Leu Phe Lys Arg Leu Leu Glu Asn His Lys Leu Pro  
 755 760 765  
 Ala Glu Pro Leu Glu Lys Pro Ile Met Leu Thr Glu Ser Leu Phe Asn  
 770 775 780  
 Gly Ser His Tyr Leu Asp Val Leu Tyr Lys Met Thr Ala Asp Asp Gln  
 785 790 795 800  
 Arg Tyr Ser Gly Ser Thr Tyr Leu Ser Asp Pro Arg Leu Thr Ala Asn  
 805 810 815  
 Gly Phe Lys Ile Lys Leu Ile Pro Gly Val Ser Ile Thr Glu Asn Tyr  
 820 825 830  
 Leu Glu Ile Glu Gly Met Ala Asn Cys Leu Pro Phe Tyr Gly Val Ala  
 835 840 845  
 Asp Leu Lys Glu Ile Leu Asn Ala Ile Leu Asn Arg Asn Ala Lys Glu  
 850 855 860  
 Val Tyr Glu Cys Arg Pro Arg Lys Val Ile Ser Tyr Leu Glu Gly Glu  
 865 870 875 880  
 Ala Val Arg Leu Ser Arg Gln Leu Pro Met Tyr Leu Ser Lys Glu Asp  
 885 890 895  
 Ile Gln Asp Ile Ile Tyr Arg Met Lys His Gln Phe Gly Asn Glu Ile  
 900 905 910  
 Lys Glu Cys Val His Gly Arg Pro Phe Phe His His Leu Thr Tyr Leu  
 915 920 925  
 Pro Glu Thr Thr  
 930

<210> 19  
 <211> 934  
 <212> PRT  
 <213> Homo sapiens

<400> 19  
 Met Ala Val Gln Pro Lys Glu Thr Leu Gln Leu Glu Ser Ala Ala Glu  
 1 5 10 15  
 Val Gly Phe Val Arg Phe Phe Gln Gly Met Pro Glu Lys Pro Thr Thr  
 20 25 30  
 Thr Val Arg Leu Phe Asp Arg Gly Asp Phe Tyr Thr Ala His Gly Glu  
 35 40 45  
 Asp Ala Leu Leu Ala Ala Arg Glu Val Phe Lys Thr Gln Gly Val Ile  
 50 55 60  
 Lys Tyr Met Gly Pro Ala Gly Ala Lys Asn Leu Gln Ser Val Val Leu  
 65 70 75 80  
 Ser Lys Met Asn Phe Glu Ser Phe Val Lys Asp Leu Leu Leu Val Arg  
 85 90 95

Gln Tyr Arg Val Glu Val Tyr Lys Asn Arg Ala Gly Asn Lys Ala Ser  
 100 105 110  
 Lys Glu Asn Asp Trp Tyr Leu Ala Tyr Lys Ala Ser Pro Gly Asn Leu  
 115 120 125  
 Ser Gln Phe Glu Asp Ile Leu Phe Gly Asn Asn Asp Met Ser Ala Ser  
 130 135 140  
 Ile Gly Val Val Gly Val Lys Met Ser Ala Val Asp Gly Gln Arg Gln  
 145 150 155 160  
 Val Gly Val Gly Tyr Val Asp Ser Ile Gln Arg Lys Leu Gly Leu Cys  
 165 170 175  
 Glu Phe Pro Asp Asn Asp Gln Phe Ser Asn Leu Glu Ala Leu Leu Ile  
 180 185 190  
 Gln Ile Gly Pro Lys Glu Cys Val Leu Pro Gly Gly Glu Thr Ala Gly  
 195 200 205  
 Asp Met Gly Lys Leu Arg Gln Ile Ile Gln Arg Gly Gly Ile Leu Ile  
 210 215 220  
 Thr Glu Arg Lys Lys Ala Asp Phe Ser Thr Lys Asp Ile Tyr Gln Asp  
 225 230 235 240  
 Leu Asn Arg Leu Leu Lys Gly Lys Lys Gly Glu Gln Met Asn Ser Ala  
 245 250 255  
 Val Leu Pro Glu Met Glu Asn Gln Val Ala Val Ser Ser Leu Ser Ala  
 260 265 270  
 Val Ile Lys Phe Leu Glu Leu Leu Ser Asp Asp Ser Asn Phe Gly Gln  
 275 280 285  
 Phe Glu Leu Thr Thr Phe Asp Phe Ser Gln Tyr Met Lys Leu Asp Ile  
 290 295 300  
 Ala Ala Val Arg Ala Leu Asn Leu Phe Gln Gly Ser Val Glu Asp Thr  
 305 310 315 320  
 Thr Gly Ser Gln Ser Leu Ala Ala Leu Leu Asn Lys Cys Lys Thr Pro  
 325 330 335  
 Gln Gly Gln Arg Leu Val Asn Gln Trp Ile Lys Gln Pro Leu Met Asp  
 340 345 350  
 Lys Asn Arg Ile Glu Glu Arg Leu Asn Leu Val Glu Ala Phe Val Glu  
 355 360 365  
 Asp Ala Glu Leu Arg Gln Thr Leu Gln Glu Asp Leu Leu Arg Arg Phe  
 370 375 380  
 Pro Asp Leu Asn Arg Leu Ala Lys Lys Phe Gln Arg Gln Ala Ala Asn  
 385 390 395 400  
 Leu Gln Asp Cys Tyr Arg Leu Tyr Gln Gly Ile Asn Gln Leu Pro Asn  
 405 410 415  
 Val Ile Gln Ala Leu Glu Lys His Glu Gly Lys His Gln Lys Leu Leu  
 420 425 430  
 Leu Ala Val Phe Val Thr Pro Leu Thr Asp Leu Arg Ser Asp Phe Ser  
 435 440 445  
 Lys Phe Gln Glu Met Ile Glu Thr Thr Leu Asp Met Asp Gln Val Glu  
 450 455 460  
 Asn His Glu Phe Leu Val Lys Pro Ser Phe Asp Pro Asn Leu Ser Glu  
 465 470 475 480  
 Leu Arg Glu Ile Met Asn Asp Leu Glu Lys Lys Met Gln Ser Thr Leu  
 485 490 495  
 Ile Ser Ala Ala Arg Asp Leu Gly Leu Asp Pro Gly Lys Gln Ile Lys  
 500 505 510  
 Leu Asp Ser Ser Ala Gln Phe Gly Tyr Tyr Phe Arg Val Thr Cys Lys  
 515 520 525  
 Glu Glu Lys Val Leu Arg Asn Asn Lys Asn Phe Ser Thr Val Asp Ile  
 530 535 540  
 Gln Lys Asn Gly Val Lys Phe Thr Asn Ser Lys Leu Thr Ser Leu Asn  
 545 550 555 560  
 Glu Glu Tyr Thr Lys Asn Lys Thr Glu Tyr Glu Glu Ala Gln Asp Ala

565 570 575  
 Ile Val Lys Glu Ile Val Asn Ile Ser Ser Gly Tyr Val Glu Pro Met  
 580 585 590  
 Gln Thr Leu Asn Asp Val Leu Ala Gln Leu Asp Ala Val Val Ser Phe  
 595 600 605  
 Ala His Val Ser Asn Gly Ala Pro Val Pro Tyr Val Arg Pro Ala Ile  
 610 615 620  
 Leu Glu Lys Gly Gln Gly Arg Ile Ile Leu Lys Ala Ser Arg His Ala  
 625 630 635 640  
 Cys Val Glu Val Gln Asp Glu Ile Ala Phe Ile Pro Asn Asp Val Tyr  
 645 650 655  
 Phe Glu Lys Asp Lys Gln Met Phe His Ile Ile Thr Gly Pro Asn Met  
 660 665 670  
 Gly Gly Lys Ser Thr Tyr Ile Arg Gln Thr Gly Val Ile Val Leu Met  
 675 680 685  
 Ala Gln Ile Gly Cys Phe Val Pro Cys Glu Ser Ala Glu Val Ser Ile  
 690 695 700  
 Val Asp Cys Ile Leu Ala Arg Val Gly Ala Gly Asp Ser Gln Leu Lys  
 705 710 715 720  
 Gly Val Ser Thr Phe Met Ala Glu Met Leu Glu Thr Ala Ser Ile Leu  
 725 730 735  
 Arg Ser Ala Thr Lys Asp Ser Leu Ile Ile Ile Asp Glu Leu Gly Arg  
 740 745 750  
 Gly Thr Ser Thr Tyr Asp Gly Phe Gly Leu Ala Trp Ala Ile Ser Glu  
 755 760 765  
 Tyr Ile Ala Thr Lys Ile Gly Ala Phe Cys Met Phe Ala Thr His Phe  
 770 775 780  
 His Glu Leu Thr Ala Leu Ala Asn Gln Ile Pro Thr Val Asn Asn Leu  
 785 790 795 800  
 His Val Thr Ala Leu Thr Thr Glu Glu Thr Leu Thr Met Leu Tyr Gln  
 805 810 815  
 Val Lys Lys Gly Val Cys Asp Gln Ser Phe Gly Ile His Val Ala Glu  
 820 825 830  
 Leu Ala Asn Phe Pro Lys His Val Ile Glu Cys Ala Lys Gln Lys Ala  
 835 840 845  
 Leu Glu Leu Glu Glu Phe Gln Tyr Ile Gly Glu Ser Gln Gly Tyr Asp  
 850 855 860  
 Ile Met Glu Pro Ala Ala Lys Lys Cys Tyr Leu Glu Arg Glu Gln Gly  
 865 870 875 880  
 Glu Lys Ile Ile Gln Glu Phe Leu Ser Lys Val Lys Gln Met Pro Phe  
 885 890 895  
 Thr Glu Met Ser Glu Glu Asn Ile Thr Ile Lys Leu Lys Gln Leu Lys  
 900 905 910  
 Ala Glu Val Ile Ala Lys Asn Asn Ser Phe Val Asn Glu Ile Ile Ser  
 915 920 925  
 Arg Ile Lys Val Thr Thr  
 930

<210> 20

<211> 756

<212> PRT

<213> Homo sapiens

<400> 20

Met Ser Phe Val Ala Gly Val Ile Arg Arg Leu Asp Glu Thr Val Val  
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 Asn Arg Ile Ala Ala Gly Glu Val Ile Gln Arg Pro Ala Asn Ala Ile  
 20 25 30  
 Lys Glu Met Ile Glu Asn Cys Leu Asp Ala Lys Ser Thr Ser Ile Gln

Val	50	Val	35	Lys	Glu	Gly	40	Leu	Lys	Leu	Ile	Gln	45	Ile	Gln	Asp	Asn
Gly	65	Thr	Gly	Ile	Arg	Lys	55	Glu	Asp	Leu	Asp	Ile	75	Val	Cys	Glu	Phe
Thr	Thr	Ser	Lys	Leu	Gln	Ser	70	Phe	Glu	Asp	Leu	Ala	90	Ser	Ile	Ser	Thr
Tyr	Gly	Phe	Arg	Gly	Glu	Ala	85	Leu	Ala	Ser	Ile	Ser	105	His	Val	Ala	His
Val	Thr	Ile	Thr	Thr	Lys	Thr	100	Ala	Asp	Gly	Lys	Cys	115	Ala	Tyr	Arg	Ala
Ser	Tyr	Ser	Asp	Gly	Lys	Leu	120	Lys	Ala	Pro	Pro	Lys	130	Pro	Cys	Ala	Gly
Asn	Gln	Gly	Thr	Gln	Ile	Thr	135	Val	Glu	Asp	Leu	Phe	140	Thr	Asn	Ile	Ala
Thr	Arg	Arg	Lys	Ala	Leu	Lys	150	Asn	Pro	Ser	Glu	Thr	155	Gly	Gly	Lys	Ile
Leu	Glu	Val	Val	Gly	Arg	Tyr	165	Ser	Val	His	Asn	Ala	170	Gly	Ile	Ser	Phe
Ser	Val	Lys	Lys	Gln	Gly	Glu	180	Thr	Val	Ala	Asp	Val	185	Arg	Thr	Leu	Pro
Asn	Ala	Ser	Thr	Val	Asp	Asn	195	Ile	Arg	Ser	Ile	Phe	200	Gly	Asn	Ala	Val
Ser	Arg	Glu	Leu	Ile	Glu	Ile	210	Gly	Cys	Glu	Asp	Lys	215	Thr	Leu	Ala	Phe
Lys	Met	Asn	Gly	Tyr	Ile	Ser	220	Asn	Ala	Asn	Tyr	Ser	225	Val	Lys	Lys	Cys
Ile	Phe	Leu	Leu	Phe	Ile	Asn	230	His	Arg	Leu	Val	Glu	235	Ser	Thr	Ser	Leu
Arg	Lys	Ala	Ile	Glu	Thr	Val	240	Tyr	Ala	Ala	Tyr	Leu	245	Pro	Lys	Asn	Thr
His	Pro	Phe	Leu	Tyr	Leu	Ser	250	Leu	Glu	Ile	Ser	Pro	255	Gln	Asn	Val	Asp
Val	Asn	Val	His	Pro	Thr	Lys	260	His	Glu	Val	His	Phe	265	Leu	His	Glu	Gly
Ser	Ile	Leu	Glu	Arg	Val	Gln	270	Gln	Gln	His	Ile	Glu	275	Ser	Lys	Leu	Leu
Ser	Asn	Ser	Ser	Arg	Met	Tyr	280	Phe	Thr	Gln	Thr	Leu	285	Leu	Pro	Gly	Leu
Ala	Gly	Pro	Ser	Gly	Glu	Met	290	Val	Lys	Ser	Thr	Thr	295	Ser	Leu	Thr	Ser
Ser	Ser	Thr	Ser	Gly	Ser	Ser	300	Asp	Lys	Val	Tyr	Ala	305	His	Gln	Met	Val
Arg	Thr	Asp	Ser	Arg	Glu	Gln	310	Lys	Leu	Asp	Ala	Phe	315	Leu	Gln	Pro	Leu
Ser	Lys	Pro	Leu	Ser	Ser	Gln	320	Pro	Gln	Ala	Ile	Val	325	Thr	Glu	Asp	Lys
Thr	Asp	Ile	Ser	Ser	Gly	Arg	330	Ala	Arg	Gln	Gln	Asp	335	Glu	Glu	Met	Leu
Glu	Leu	Pro	Ala	Pro	Ala	Glu	340	Val	Ala	Ala	Lys	Asn	345	Gln	Ser	Leu	Glu
Gly	Asp	Thr	Thr	Lys	Gly	Thr	350	Ser	Glu	Met	Ser	Glu	355	Lys	Arg	Gly	Pro
Thr	Ser	Ser	Asn	Pro	Arg	Lys	360	Arg	His	Arg	Glu	Asp	365	Ser	Asp	Val	Glu
Met	Val	Glu	Asp	Asp	Ser	Arg	370	Lys	Glu	Met	Thr	Ala	375	Ala	Cys	Thr	Pro
Arg	Arg	Arg	Ile	Ile	Asn	Leu	380	Thr	Ser	Val	Leu	Ser	385	Leu	Gln	Glu	Glu

Ile Asn Glu Gln Gly His Glu Val Leu Arg Glu Met Leu His Asn His  
 515 520 525  
 Ser Phe Val Gly Cys Val Asn Pro Gln Trp Ala Leu Ala Gln His Gln  
 530 535 540  
 Thr Lys Leu Tyr Leu Leu Asn Thr Thr Lys Leu Ser Glu Glu Leu Phe  
 545 550 555 560  
 Tyr Gln Ile Leu Ile Tyr Asp Phe Ala Asn Phe Gly Val Leu Arg Leu  
 565 570 575  
 Ser Glu Pro Ala Pro Leu Phe Asp Leu Ala Met Leu Ala Leu Asp Ser  
 580 585 590  
 Pro Glu Ser Gly Trp Thr Glu Glu Asp Gly Pro Lys Glu Gly Leu Ala  
 595 600 605  
 Glu Tyr Ile Val Glu Phe Leu Lys Lys Lys Ala Glu Met Leu Ala Asp  
 610 615 620  
 Tyr Phe Ser Leu Glu Ile Asp Glu Glu Gly Asn Leu Ile Gly Leu Pro  
 625 630 635 640  
 Leu Leu Ile Asp Asn Tyr Val Pro Pro Leu Glu Gly Leu Pro Ile Phe  
 645 650 655  
 Ile Leu Arg Leu Ala Thr Glu Val Asn Trp Asp Glu Glu Lys Glu Cys  
 660 665 670  
 Phe Glu Ser Leu Ser Lys Glu Cys Ala Met Phe Tyr Ser Ile Arg Lys  
 675 680 685  
 Gln Tyr Ile Ser Glu Glu Ser Thr Leu Ser Gly Gln Gln Ser Glu Val  
 690 695 700  
 Pro Gly Ser Ile Pro Asn Ser Trp Lys Trp Thr Val Glu His Ile Val  
 705 710 715 720  
 Tyr Lys Ala Leu Arg Ser His Ile Leu Pro Pro Lys His Phe Thr Glu  
 725 730 735  
 Asp Gly Asn Ile Leu Gln Leu Ala Asn Leu Pro Asp Leu Tyr Lys Val  
 740 745 750  
 Phe Glu Arg Cys  
 755

<210> 21  
 <211> 133  
 <212> PRT  
 <213> Homo sapiens

<400> 21  
 Met Lys Gln Leu Pro Ala Ala Thr Val Arg Leu Leu Ser Ser Ser Gln  
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 Ile Ile Thr Ser Val Val Ser Val Val Lys Glu Leu Ile Glu Asn Ser  
 20 25 30  
 Leu Asp Ala Gly Ala Thr Ser Val Asp Val Lys Leu Glu Asn Tyr Gly  
 35 40 45  
 Phe Asp Lys Ile Glu Val Arg Asp Asn Gly Glu Gly Ile Lys Ala Val  
 50 55 60  
 Asp Ala Pro Val Met Ala Met Lys Tyr Tyr Thr Ser Lys Ile Asn Ser  
 65 70 75 80  
 His Glu Asp Leu Glu Asn Leu Thr Thr Tyr Gly Phe Arg Gly Glu Ala  
 85 90 95  
 Leu Gly Ser Ile Cys Cys Ile Ala Glu Val Leu Ile Thr Thr Arg Thr  
 100 105 110  
 Ala Ala Asp Asn Phe Ser Thr Gln Tyr Val Leu Asp Gly Ser Gly His  
 115 120 125  
 Ile Leu Ser Gln Lys  
 130

<210> 22

<211> 1360  
 <212> PRT  
 <213> Homo sapiens

<400> 22

Met	Ser	Arg	Gln	Ser	Thr	Leu	Tyr	Ser	Phe	Phe	Pro	Lys	Ser	Pro	Ala
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Leu	Ser	Asp	Ala	Asn	Lys	Ala	Ser	Ala	Arg	Ala	Ser	Arg	Glu	Gly	Gly
		20						25					30		
Arg	Ala	Ala	Ala	Ala	Pro	Gly	Ala	Ser	Pro	Ser	Pro	Gly	Gly	Asp	Ala
		35				40						45			
Ala	Trp	Ser	Glu	Ala	Gly	Pro	Gly	Pro	Arg	Pro	Leu	Ala	Arg	Ser	Ala
	50					55					60				
Ser	Pro	Pro	Lys	Ala	Lys	Asn	Leu	Asn	Gly	Gly	Leu	Arg	Arg	Ser	Val
65				70					75					80	
Ala	Pro	Ala	Ala	Pro	Thr	Ser	Cys	Asp	Phe	Ser	Pro	Gly	Asp	Leu	Val
			85					90					95		
Trp	Ala	Lys	Met	Glu	Gly	Tyr	Pro	Trp	Trp	Pro	Cys	Leu	Val	Tyr	Asn
		100						105					110		
His	Pro	Phe	Asp	Gly	Thr	Phe	Ile	Arg	Glu	Lys	Gly	Lys	Ser	Val	Arg
		115					120					125			
Val	His	Val	Gln	Phe	Phe	Asp	Asp	Ser	Pro	Thr	Arg	Gly	Trp	Val	Ser
	130					135					140				
Lys	Arg	Leu	Leu	Lys	Pro	Tyr	Thr	Gly	Ser	Lys	Ser	Lys	Glu	Ala	Gln
145				150					155					160	
Lys	Gly	Gly	His	Phe	Tyr	Ser	Ala	Lys	Pro	Glu	Ile	Leu	Arg	Ala	Met
			165					170					175		
Gln	Arg	Ala	Asp	Glu	Ala	Leu	Asn	Lys	Asp	Lys	Ile	Lys	Arg	Leu	Glu
		180					185					190			
Leu	Ala	Val	Cys	Asp	Glu	Pro	Ser	Glu	Pro	Glu	Glu	Glu	Glu	Glu	Met
		195				200					205				
Glu	Val	Gly	Thr	Thr	Tyr	Val	Thr	Asp	Lys	Ser	Glu	Glu	Asp	Asn	Glu
	210					215					220				
Ile	Glu	Ser	Glu	Glu	Glu	Val	Gln	Pro	Lys	Thr	Gln	Gly	Ser	Arg	Arg
225				230					235					240	
Ser	Ser	Arg	Gln	Ile	Lys	Lys	Arg	Arg	Val	Ile	Ser	Asp	Ser	Glu	Ser
			245					250					255		
Asp	Ile	Gly	Gly	Ser	Asp	Val	Glu	Phe	Lys	Pro	Asp	Thr	Lys	Glu	Glu
	260					265						270			
Gly	Ser	Ser	Asp	Glu	Ile	Ser	Ser	Gly	Val	Gly	Asp	Ser	Glu	Ser	Glu
	275					280					285				
Gly	Leu	Asn	Ser	Pro	Val	Lys	Val	Ala	Arg	Lys	Arg	Lys	Arg	Met	Val
	290					295				300					
Thr	Gly	Asn	Gly	Ser	Leu	Lys	Arg	Lys	Ser	Ser	Arg	Lys	Glu	Thr	Pro
305				310					315					320	
Ser	Ala	Thr	Lys	Gln	Ala	Thr	Ser	Ile	Ser	Ser	Glu	Thr	Lys	Asn	Thr
			325					330					335		
Leu	Arg	Ala	Phe	Ser	Ala	Pro	Gln	Asn	Ser	Glu	Ser	Gln	Ala	His	Val
		340						345				350			
Ser	Gly	Gly	Gly	Asp	Asp	Ser	Ser	Arg	Pro	Thr	Val	Trp	Tyr	His	Glu
	355					360					365				
Thr	Leu	Glu	Trp	Leu	Lys	Glu	Glu	Lys	Arg	Arg	Asp	Glu	His	Arg	Arg
	370				375						380				
Arg	Pro	Asp	His	Pro	Asp	Phe	Asp	Ala	Ser	Thr	Leu	Tyr	Val	Pro	Glu
385				390					395					400	
Asp	Phe	Leu	Asn	Ser	Cys	Thr	Pro	Gly	Met	Arg	Lys	Trp	Trp	Gln	Ile
			405					410						415	
Lys	Ser	Gln	Asn	Phe	Asp	Leu	Val	Ile	Cys	Tyr	Lys	Val	Gly	Lys	Phe
		420						425					430		

Tyr Glu Leu Tyr His Met Asp Ala Leu Ile Gly Val Ser Glu Leu Gly  
 435 440 445  
 Leu Val Phe Met Lys Gly Asn Trp Ala His Ser Gly Phe Pro Glu Ile  
 450 455 460  
 Ala Phe Gly Arg Tyr Ser Asp Ser Leu Val Gln Lys Gly Tyr Lys Val  
 465 470 475 480  
 Ala Arg Val Glu Gln Thr Glu Thr Pro Glu Met Met Glu Ala Arg Cys  
 485 490 495  
 Arg Lys Met Ala His Ile Ser Lys Tyr Asp Arg Val Val Arg Arg Glu  
 500 505 510  
 Ile Cys Arg Ile Ile Thr Lys Gly Thr Gln Thr Tyr Ser Val Leu Glu  
 515 520 525  
 Gly Asp Pro Ser Glu Asn Tyr Ser Lys Tyr Leu Leu Ser Leu Lys Glu  
 530 535 540  
 Lys Glu Glu Asp Ser Ser Gly His Thr Arg Ala Tyr Gly Val Cys Phe  
 545 550 555 560  
 Val Asp Thr Ser Leu Gly Lys Phe Phe Ile Gly Gln Phe Ser Asp Asp  
 565 570 575  
 Arg His Cys Ser Arg Phe Arg Thr Leu Val Ala His Tyr Pro Pro Val  
 580 585 590  
 Gln Val Leu Phe Glu Lys Gly Asn Leu Ser Lys Glu Thr Lys Thr Ile  
 595 600 605  
 Leu Lys Ser Ser Leu Ser Cys Ser Leu Gln Glu Gly Leu Ile Pro Gly  
 610 615 620  
 Ser Gln Phe Trp Asp Ala Ser Lys Thr Leu Arg Thr Leu Leu Glu Glu  
 625 630 635 640  
 Glu Tyr Phe Arg Glu Lys Leu Ser Asp Gly Ile Gly Val Met Leu Pro  
 645 650 655  
 Gln Val Leu Lys Gly Met Thr Ser Glu Ser Asp Ser Ile Gly Leu Thr  
 660 665 670  
 Pro Gly Glu Lys Ser Glu Leu Ala Leu Ser Ala Leu Gly Gly Cys Val  
 675 680 685  
 Phe Tyr Leu Lys Lys Cys Leu Ile Asp Gln Glu Leu Leu Ser Met Ala  
 690 695 700  
 Asn Phe Glu Glu Tyr Ile Pro Leu Asp Ser Asp Thr Val Ser Thr Thr  
 705 710 715 720  
 Arg Ser Gly Ala Ile Phe Thr Lys Ala Tyr Gln Arg Met Val Leu Asp  
 725 730 735  
 Ala Val Thr Leu Asn Asn Leu Glu Ile Phe Leu Asn Gly Thr Asn Gly  
 740 745 750  
 Ser Thr Glu Gly Thr Leu Leu Glu Arg Val Asp Thr Cys His Thr Pro  
 755 760 765  
 Phe Gly Lys Arg Leu Leu Lys Gln Trp Leu Cys Ala Pro Leu Cys Asn  
 770 775 780  
 His Tyr Ala Ile Asn Asp Arg Leu Asp Ala Ile Glu Asp Leu Met Val  
 785 790 795 800  
 Val Pro Asp Lys Ile Ser Glu Val Val Glu Leu Leu Lys Lys Leu Pro  
 805 810 815  
 Asp Leu Glu Arg Leu Leu Ser Lys Ile His Asn Val Gly Ser Pro Leu  
 820 825 830  
 Lys Ser Gln Asn His Pro Asp Ser Arg Ala Ile Met Tyr Glu Glu Thr  
 835 840 845  
 Thr Tyr Ser Lys Lys Lys Ile Ile Asp Phe Leu Ser Ala Leu Glu Gly  
 850 855 860  
 Phe Lys Val Met Cys Lys Ile Ile Gly Ile Met Glu Glu Val Ala Asp  
 865 870 875 880  
 Gly Phe Lys Ser Lys Ile Leu Lys Gln Val Ile Ser Leu Gln Thr Lys  
 885 890 895  
 Asn Pro Glu Gly Arg Phe Pro Asp Leu Thr Val Glu Leu Asn Arg Trp



900										905										910									
Asp	Thr	Ala	Phe	Asp	His	Glu	Lys	Ala	Arg	Lys	Thr	Gly	Leu	Ile	Thr					Lys	Thr	Gly	Leu	Ile	Thr				
Pro	Lys	Ala	Gly	Phe	Asp	Ser	Asp	Tyr	Asp	Gln	Ala	Leu	Ala	Asp	Ile					Gln	Ala	Leu	Ala	Asp	Ile				
Arg	Glu	Asn	Glu	Gln	Ser	Leu	Leu	Glu	Tyr	Leu	Glu	Lys	Gln	Arg	Asn					Leu	Glu	Lys	Gln	Arg	Asn				
Arg	Ile	Gly	Cys	Arg	Thr	Ile	Val	Tyr	Trp	Gly	Ile	Gly	Arg	Asn	Arg					Gly	Ile	Gly	Arg	Asn	Arg				
Tyr	Gln	Leu	Glu	Ile	Pro	Glu	Asn	Phe	Thr	Thr	Arg	Asn	Leu	Pro	Glu					Thr	Arg	Asn	Leu	Pro	Glu				
Glu	Tyr	Glu	Leu	Lys	Ser	Thr	Lys	Lys	Gly	Cys	Lys	Arg	Tyr	Trp	Thr					Cys	Lys	Arg	Tyr	Trp	Thr				
Lys	Thr	Ile	Glu	Lys	Lys	Leu	Ala	Asn	Leu	Ile	Asn	Ala	Glu	Glu	Arg					Ile	Asn	Ala	Glu	Glu	Arg				
Arg	Asp	Val	Ser	Leu	Lys	Asp	Cys	Met	Arg	Arg	Leu	Phe	Tyr	Asn	Phe					Arg	Leu	Phe	Tyr	Asn	Phe				
Asp	Lys	Asn	Tyr	Lys	Asp	Trp	Gln	Ser	Ala	Val	Glu	Cys	Ile	Ala	Val					Val	Glu	Cys	Ile	Ala	Val				
Leu	Asp	Val	Leu	Leu	Cys	Leu	Ala	Asn	Tyr	Ser	Arg	Gly	Asp	Gly					Ser	Arg	Gly	Asp	Gly						
Pro	Met	Cys	Arg	Pro	Val	Ile	Leu	Leu	Pro	Glu	Asp	Thr	Pro	Pro	Phe					Glu	Asp	Thr	Pro	Pro	Phe				
Leu	Glu	Leu	Lys	Gly	Ser	Arg	His	Pro	Cys	Ile	Thr	Lys	Thr	Phe	Phe					Ile	Thr	Lys	Thr	Phe	Phe				
Gly	Asp	Asp	Phe	Ile	Pro	Asn	Asp	Ile	Leu	Ile	Gly	Cys	Glu	Glu	Glu					Ile	Gly	Cys	Glu	Glu	Glu				
Glu	Gln	Glu	Asn	Gly	Lys	Ala	Tyr	Cys	Val	Leu	Val	Thr	Gly	Pro	Asn					Val	Leu	Val	Thr	Gly	Pro				
Met	Gly	Gly	Lys	Ser	Thr	Leu	Met	Arg	Gln	Ala	Gly	Leu	Leu	Ala	Val					Ala	Gly	Leu	Leu	Ala	Val				
Met	Ala	Gln	Met	Gly	Cys	Tyr	Val	Pro	Ala	Glu	Val	Cys	Arg	Leu	Thr					Val	Cys	Arg	Leu	Leu	Thr				
Pro	Ile	Asp	Arg	Val	Phe	Thr	Arg	Leu	Gly	Ala	Ser	Asp	Arg	Ile	Met					Ala	Ser	Asp	Arg	Ile	Met				
Ser	Gly	Glu	Ser	Thr	Phe	Phe	Val	Glu	Leu	Ser	Glu	Thr	Ala	Ser	Ile					Thr	Ala	Ser	Glu	Ser	Ile				
Leu	Met	His	Ala	Thr	Ala	His	Ser	Leu	Val	Leu	Val	Asp	Glu	Leu	Gly					Val	Leu	Val	Asp	Glu	Leu				
Arg	Gly	Thr	Ala	Thr	Phe	Asp	Gly	Thr	Ala	Ile	Ala	Asn	Ala	Val	Val					Ala	Asn	Ala	Val	Val	Val				
Lys	Glu	Leu	Ala	Glu	Thr	Ile	Lys	Cys	Arg	Thr	Leu	Phe	Ser	Thr	His					Thr	Leu	Phe	Ser	Thr	His				
Tyr	His	Ser	Leu	Val	Glu	Asp	Tyr	Ser	Gln	Asn	Val	Ala	Val	Arg	Leu					Val	Ala	Val	Arg	Leu					
Gly	His	Met	Ala	Cys	Met	Val	Glu	Asn	Glu	Cys	Glu	Asp	Pro	Ser	Gln					Glu	Asp	Pro	Ser	Gln					
Glu	Thr	Ile	Thr	Phe	Leu	Tyr	Lys	Phe	Ile	Lys	Gly	Ala	Cys	Pro	Lys					Lys	Gly	Ala	Cys	Pro	Lys				
Ser	Tyr	Gly	Phe	Asn	Ala	Ala	Arg	Leu	Ala	Asn	Leu	Pro	Glu	Glu	Val					Ala	Asn	Leu	Pro	Glu	Glu				
Ile	Gln	Lys	Gly	His	Arg	Lys	Ala	Arg	Glu	Phe	Glu	Lys	Met	Asn	Gln					Glu	Phe	Glu	Lys	Met	Asn				
Ser	Leu	Arg	Leu	Phe	Arg	Glu	Val	Cys	Leu	Ala	Ser	Glu	Arg	Ser	Thr					Ala	Ser	Glu	Arg	Ser	Thr				
Val	Asp	Ala	Glu	Ala	Val	His	Lys	Leu	Leu	Thr	Leu	Ile	Lys	Glu	Leu					Leu	Thr	Leu	Ile	Lys	Glu				

<211> 389  
 <212> PRT  
 <213> Homo sapiens

<400> 23  
 Met Ala Gln Pro Lys Gln Glu Arg Val Ala Arg Ala Arg His Gln Arg  
 1 5 10 15  
 Ser Glu Thr Ala Arg His Gln Arg Ser Glu Thr Ala Lys Thr Pro Thr  
 20 25 30  
 Leu Gly Asn Arg Gln Thr Pro Thr Leu Gly Asn Arg Gln Thr Pro Arg  
 35 40 45  
 Leu Gly Ile His Ala Arg Pro Arg Arg Arg Ala Thr Thr Ser Leu Leu  
 50 55 60  
 Thr Leu Leu Leu Ala Phe Gly Lys Asn Ala Val Arg Cys Ala Leu Ile  
 65 70 75 80  
 Gly Pro Gly Ser Leu Thr Ser Arg Thr Arg Pro Leu Thr Glu Pro Leu  
 85 90 95  
 Gly Glu Lys Glu Arg Arg Glu Val Phe Pro Pro Arg Pro Glu Arg  
 100 105 110  
 Val Glu His Asn Val Glu Ser Ser Arg Trp Glu Pro Arg Arg Gly  
 115 120 125  
 Ala Cys Gly Ser Arg Gly Gly Asn Phe Pro Ser Pro Arg Gly Gly Ser  
 130 135 140  
 Gly Val Ala Ser Leu Glu Arg Ala Glu Asn Ser Ser Thr Glu Pro Ala  
 145 150 155 160  
 Lys Ala Ile Lys Pro Ile Asp Arg Lys Ser Val His Gln Ile Cys Ser  
 165 170 175  
 Gly Pro Val Val Pro Ser Leu Arg Pro Asn Ala Val Lys Glu Leu Val  
 180 185 190  
 Glu Asn Ser Leu Asp Ala Gly Ala Thr Asn Val Asp Leu Lys Leu Lys  
 195 200 205  
 Asp Tyr Gly Val Asp Leu Ile Glu Val Ser Gly Asn Gly Cys Gly Val  
 210 215 220  
 Glu Glu Glu Asn Phe Glu Gly Phe Thr Leu Lys His His Thr Cys Lys  
 225 230 235 240  
 Ile Gln Glu Phe Ala Asp Leu Thr Gln Val Glu Thr Phe Gly Phe Arg  
 245 250 255  
 Gly Glu Ala Leu Ser Ser Leu Cys Ala Leu Ser Asp Val Thr Ile Ser  
 260 265 270  
 Thr Cys Arg Val Ser Ala Lys Val Gly Thr Arg Leu Val Phe Asp His  
 275 280 285  
 Tyr Gly Lys Ile Ile Gln Lys Thr Pro Tyr Pro Arg Pro Arg Gly Met  
 290 295 300  
 Thr Val Ser Val Lys Gln Leu Phe Ser Thr Leu Pro Val His His Lys  
 305 310 315 320  
 Glu Phe Gln Arg Asn Ile Lys Lys Lys Arg Ala Cys Phe Pro Phe Ala  
 325 330 335  
 Phe Cys Arg Asp Cys Gln Phe Pro Glu Ala Ser Pro Ala Met Leu Pro  
 340 345 350  
 Val Gln Pro Val Glu Leu Thr Pro Arg Ser Thr Pro Pro His Pro Cys  
 355 360 365  
 Ser Leu Glu Asp Asn Val Ile Thr Val Phe Ser Ser Val Lys Asn Gly  
 370 375 380  
 Pro Gly Ser Ser Arg  
 385

<210> 24  
 <211> 264  
 <212> PRT

<213> Homo sapiens

<400> 24

Met Cys Pro Trp Arg Pro Arg Leu Gly Arg Arg Cys Met Val Ser Pro  
1 5 10 15  
Arg Glu Ala Asp Leu Gly Pro Gln Lys Asp Thr Arg Leu Asp Leu Pro  
20 25 30  
Arg Ser Pro Ala Arg Ala Pro Arg Glu Gln Asn Ser Leu Gly Glu Val  
35 40 45  
Asp Arg Arg Gly Pro Arg Glu Gln Thr Arg Ala Pro Ala Thr Ala Ala  
50 55 60  
Pro Pro Arg Pro Leu Gly Ser Arg Gly Ala Glu Ala Ala Glu Pro Gln  
65 70 75 80  
Glu Gly Leu Ser Ala Thr Val Ser Ala Cys Phe Gln Glu Gln Gln Glu  
85 90 95  
Met Asn Thr Leu Gln Gly Pro Val Ser Phe Lys Asp Val Ala Val Asp  
100 105 110  
Phe Thr Gln Glu Glu Trp Arg Gln Leu Asp Pro Asp Glu Lys Ile Ala  
115 120 125  
Tyr Gly Asp Val Met Leu Glu Asn Tyr Ser His Leu Val Ser Val Gly  
130 135 140  
Tyr Asp Tyr His Gln Ala Lys His His His Gly Val Glu Val Lys Glu  
145 150 155 160  
Val Glu Gln Gly Glu Glu Pro Trp Ile Met Glu Gly Glu Phe Pro Cys  
165 170 175  
Gln His Ser Pro Glu Pro Ala Lys Ala Ile Lys Pro Ile Asp Arg Lys  
180 185 190  
Ser Val His Gln Ile Cys Ser Gly Pro Val Val Leu Ser Leu Ser Thr  
195 200 205  
Ala Val Lys Glu Leu Val Glu Asn Ser Leu Asp Ala Gly Ala Thr Asn  
210 215 220  
Ile Asp Leu Lys Leu Lys Asp Tyr Gly Val Asp Leu Ile Glu Val Ser  
225 230 235 240  
Asp Asn Gly Cys Gly Val Glu Glu Glu Asn Phe Glu Gly Leu Ile Ser  
245 250 255  
Phe Ser Ser Glu Thr Ser His Met  
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<210> 25

<211> 264

<212> PRT

<213> Homo sapiens

<400> 25

Met Cys Pro Trp Arg Pro Arg Leu Gly Arg Arg Cys Met Val Ser Pro  
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20 25 30  
Arg Ser Pro Ala Arg Ala Pro Arg Glu Gln Asn Ser Leu Gly Glu Val  
35 40 45  
Asp Arg Arg Gly Pro Arg Glu Gln Thr Arg Ala Pro Ala Thr Ala Ala  
50 55 60  
Pro Pro Arg Pro Leu Gly Ser Arg Gly Ala Glu Ala Ala Glu Pro Gln  
65 70 75 80  
Glu Gly Leu Ser Ala Thr Val Ser Ala Cys Phe Gln Glu Gln Gln Glu  
85 90 95  
Met Asn Thr Leu Gln Gly Pro Val Ser Phe Lys Asp Val Ala Val Asp  
100 105 110  
Phe Thr Gln Glu Glu Trp Arg Gln Leu Asp Pro Asp Glu Lys Ile Ala

115 120 125  
 Tyr Gly Asp Val Met Leu Glu Asn Tyr Ser His Leu Val Ser Val Gly  
 130 135 140  
 Tyr Asp Tyr His Gln Ala Lys His His His Gly Val Glu Val Lys Glu  
 145 150 155 160  
 Val Glu Gln Gly Glu Glu Pro Trp Ile Met Glu Gly Glu Phe Pro Cys  
 165 170 175  
 Gln His Ser Pro Glu Pro Ala Lys Ala Ile Lys Pro Ile Asp Arg Lys  
 180 185 190  
 Ser Val His Gln Ile Cys Ser Gly Pro Val Val Leu Ser Leu Ser Thr  
 195 200 205  
 Ala Val Lys Glu Leu Val Glu Asn Ser Leu Asp Ala Gly Ala Thr Asn  
 210 215 220  
 Ile Asp Leu Lys Leu Lys Asp Tyr Gly Val Asp Leu Ile Glu Val Ser  
 225 230 235 240  
 Asp Asn Gly Cys Gly Val Glu Glu Glu Asn Phe Glu Gly Leu Ile Ser  
 245 250 255  
 Phe Ser Ser Glu Thr Ser His Met  
 260

<210> 26

<400> 26

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